What is claimed is:

1. A method of protecting a mammalian central nervous system (CNS) cell from damage, comprising administering a therapeutically effective amount of L-ergothioneine to a mammal in need thereof.

2. The method of claim 1, wherein the CNS cell is a neuronal cell.

3. The method of claim 2, wherein the neuronal cell is a ganglion and a non-ganglion cell.

4. The method of claim 2, wherein the neuronal cell is one or more of a cholinergic, a dopaminergic and a GABAergic neurons.

5. The method of claim 2, wherein the neuronal cell is a dopaminergic neuron.

6. The method of claim 5, wherein the dopaminergic neurons are tyrosine hydroxylase positive (TH+) cells of the substantia nigra.

7. The method of claim 1, wherein the damage results from exposure to an oxidant.

8. The method of claim 7, wherein the oxidant is selected from the group consisting of singlet oxygen, hydrogen peroxide, nitric oxide, hypochlorous acid, hydroxyl radicals, peroxyl radicals, and metalloenzymes.

9. The method of claim 1, wherein the damage results from exposure to a cytokine.

10. The method of claim 9, wherein the cytokine is tumor necrosis factor-α (TNF-α) or gamma interferon.

11. The method of claim 1, wherein the damage results from exposure to a neurotoxic compound.

12. The method of claim 11, wherein the neurotoxic compound is selected from the group consisting of glutamate, a glutamate analog, and an anticancer compound.

13. The method of claim 1, wherein the damage results from the presence of a neurodegenerative disease.

14. The method of claim 13, wherein the neurodegenerative disease is selected from the group consisting of Alzheimer's disease, multiple sclerosis, Down's syndrome, amyotropic lateral sclerosis, Parkinson's disease, traumatic brain injury, acute and chronic spinal cord injury, macular degeneration, HIV/AIDS, optic neuropathies and retinopathies.

15. The method of claim 1, wherein the mammal is a human being.

16. The method of claim 1, wherein L-ergothioneine is administered as a dietary supplement.

17. The method of claim 16, wherein the dietary supplement is in the form of an oral capsule, tablet, or suspension.

18. The method of claim 1, wherein L-ergothioneine is administered in combination with a second anti-oxidant.

19. The method of claim 18, wherein the second anti-oxidant is vitamin C or vitamin E.

20. The method of claim 1, wherein L-ergothioneine is administered in combination with agents that aid in protection of neuronal cells, or agents that aid in cellular proliferation and/or tissue regeneration and/or remyelination.

21. The method of claim 20, wherein said agents that aid in protection of neuronal cells, or agents that aid in cellular proliferation and/or tissue regeneration and/or remyelination are selected from the group consisting of small synthetic organic compounds, proteins, peptides, polypeptides, nucleic acids, polynucleotides, antisense oligonucleotides, and antibodies.

22. The method of claim 20, wherein said agent is a ROS scavenger selected from the group consisting of coenzyme Q, vitamin E, vitamin C, pyruvate, melatonin, niacinamide, N-acetylcysteine, GSH, and nitrones.

23. The method of claim 20, wherein said agent is selected from the group consisting of neurotrophic factors, ligands that bind to and activate receptor protein kinases, agonist ligands for integrin receptors, receptor mimics, members of the immunoglobulin superfamily and remyelinating antibodies.

24. A method of treating or ameliorating damage to a mammalian central nervous system (CNS) cell from a neurodegenerative disease, comprising administering a therapeutically effective amount of L-ergothioneine to a mammal in need thereof.

25. The method of claim 24,wherein administration of L-ergothioneine is chronic.

26. The method of claim 24, wherein the neurodegenerative disease is selected from the group consisting of Alzheimer's disease, multiple sclerosis, Down's syndrome, amyotropic lateral sclerosis, Parkinson's disease, traumatic brain injury, acute or chronic spinal cord injury, macular degeneration, HIV/AIDS, optic neuropathies and retinopathies.

27. The method of claim 24, wherein the CNS cell is a neuronal cell.

28. The method of claim 27, wherein the neuronal cell is a ganglion and a non-ganglion cell.

29. The method of claim 27, wherein the neuronal cell is one or more of a cholinergic, a dopaminergic and a GABAergic neurons.

30. The method of claim 27, wherein the neuronal cell is a dopaminergic neuron.

31. The method of claim 30, wherein the dopaminergic neurons are tyrosine hydroxylase positive (TH+) cells of the substantia nigra.

32. A screening method for identifying compounds capable of protecting central nervous system (CNS) cells from damage, comprising (a) treating retinal neurons to a neurotoxic agent with and without treatment with a test compound; and (b) determining the effect of the test compound on a retinal neuron population, wherein a test compound capable of increasing cell survival is identified as a neuroprotective agent.

33. A screening method for identifying compounds capable of protecting central nervous system (CNS) cells from damage, comprising (a) treating dopaminergic neurons with 6-OHDA with and without treatment with a test compound; and (b) determining the effect of the test compound on the dopaminergic neuron population, wherein a test compound capable of increasing cell survival is identified as a neuroprotective agent.

34. The method of claim 1, wherein the administering is by oral administration or by intravitreal, intramuscular, intraperitoneal, intrathecal, intraventricular or intracranial injection.

35. A pharmaceutical composition comprising a therapeutically effective amount of L-ergothioneine and a pharmaceutically acceptable carrier.

36. The pharmaceutical composition of claim 35, further comprising a therapeutically effective amount of an agent that aids in protection of neuronal cells, or an agent that aids in cellular proliferation and/or tissue regeneration and/or remyelination.

37. The pharmaceutical composition of claim 36, wherein the agent is selected from the group consisting of small synthetic organic compounds, proteins, peptides, polypeptides, nucleic acids, polynucleotides, antisense oligonucleotides, and antibodies.

38. The pharmaceutical composition of claim 37, wherein the agent is a Reactive Oxygen Species (ROS) or a Reactive Nitrogen Species (RNS) scavenger.

39. The pharmaceutical composition of claim 38, wherein the ROS scavenger is selected from the group consisting of coenzyme Q, vitamin E, vitamin C, pyruvate, melatonin, niacinamide, N-acetylcysteine, GSH, and nitrones.

40. The pharmaceutical composition of claim 37, wherein the agent is selected from the group consisting of neurotrophic factors, ligands that bind to and activate receptor protein kinases, agonist ligands for integrin receptors, receptor mimics, members of the immunoglobulin superfamily and remyelinating antibodies.